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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/827,418

04/20/2004

Katsumi Mori

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EXAMINER

STIMPert, PHILIP EARL

ART UNIT

PAPER NUMBER

3709

MAIL DATE

DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/827,418

Applicant(s)

MORI, KATSUMI

Examiner

Philip E. Stimpert

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 April 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 August 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date See Continuation Sheet.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- ☐ Notice of Informal Patent Application
- ☐ Other: _____.

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :20 April 2004, 10 August 2006, 15 August 2006.

DETAILED ACTION

Claim Objections

1. Claim 1 is objected to because of the following informalities: lines 15-16 of the claim recites "so as to hold said cam ring from rotate to move said plunger linearly." This wording is neither grammatically correct nor clear. Claim 4 includes a very similar limitation on lines 20-23, which the examiner suggests emulating in claim 1. For the purposes of this office action, the above phrase will be construed to mean that the abutment between the flat surfaces of the cam ring and plunger simultaneously prevents the rotation of the cam ring and causes the reciprocation of the plungers. Appropriate correction is required.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
2. Claim 3 recites the limitation "an outer periphery" in line 3 of the claim. This conflicts with the earlier recitation of the same on lines 10-11 of claim 1.
3. Claim 6 also recites the limitation "an outer periphery" in line 3 of the claim. This conflicts with the earlier recitation of the same on lines 15-16 of claim 4.
4. Both of these occurrences could be corrected by altering the second instance to read "the outer periphery," or "said outer periphery."

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1-6 are rejected under 35 U.S.C. 102(e) as being anticipated by Suzuki et al (US 2003/0108443).

The applied reference has a common assignee with the instant application.

Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

7. Regarding claim 1, Suzuki et al teach a rotation-to-linear motion transforming apparatus comprising:

- an eccentric cam (21) coupled to a torque input shaft (15), the cam being rotated eccentrically with respect to the torque input shaft
- a cam ring (80) whose inner wall is placed in contact with the eccentric cam (21) such that the cam ring (80) is urged to rotate by the eccentric cam (21), the cam ring having a flat surface (see Fig. 6B) formed on an outer periphery
- a plunger (20) placed to be movable linearly in a direction perpendicular (see Fig. 2) to the axis of rotation of the eccentric cam (21), the plunger (20) having a flat surface which is pressed against said cam ring (80) in slidable

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abutment with the flat surface of said cam ring (80) so as to prevent the cam ring from rotating and thereby cause the cam ring (80) to move the plunger (20) linearly

- a safeguard (71) provided in said cam ring which is responsive to application of a physical load greater than a given degree in a direction of rotation of said eccentric cam to undergo breakage

The examiner notes that the grooves (71) of Suzuki et al are not explicitly intended as safeguards. However, the grooves would fulfill the function specified, as they would form the basis for cracks within the cam ring upon the application of sufficient force, causing breakage in the cam ring.

8. Regarding claim 2, Suzuki et al teach that the safeguard (71) is provided in a portion of the cam ring (80) which is out of abutment with the plunger (20) and to which a tensile stress is added when resistance to sliding motion of the cam ring (80) relative to the plunger (20) increases.

9. Regarding claim 3, Suzuki et al teach that the safeguard (71) is implemented by a groove (see paragraph 89, lines 1-3) formed in the outer periphery of the cam ring (80).

10. Regarding claim 4, Suzuki et al teach a fuel injection pump (title) for an engine (paragraph 3) having a housing (10) having formed therein a cam chamber (40) into which fuel is supplied (paragraph 65, lines 4-5). Suzuki et al further teach that the eccentric cam (21) is disposed within the cam chamber (40) of the housing in mechanical connection with a torque input shaft (15) into which torque outputted by an

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engine is inputted, the eccentric cam (21) being rotated eccentrically with respect to the torque input shaft. Suzuki et al substantially teach the remaining limitations of the fuel pump as discussed in the rejection of claim 1 over Suzuki et al above.

11. Regarding claim 5, Suzuki et al teach that the safeguard (71) is provided in a portion of the cam ring (80) which is out of abutment with the plunger (20) and to which a tensile stress is added when resistance to sliding motion of the cam ring (80) relative to the plunger (20) increases.

12. Regarding claim 6, Suzuki et al teach that the safeguard (71) is implemented by a groove (see paragraph 89, lines 1-3) formed in the outer periphery of the cam ring (80).

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being obvious over Mori (US 2001/0015200) in view of Iwasaki et al (US 5,873,784), further in view of Beauchanveau et al (US 5,850,817).

The applied reference (Mori) has the same inventor as the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in

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the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). This rejection might also be overcome by showing that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(I)(1) and § 706.02(I)(2).

15. Regarding claim 1, Mori teaches a rotation-to-linear motion transforming apparatus used in a fuel pump, comprising:

- an eccentric cam (21) coupled to a torque input shaft (70), the cam (21) being rotated eccentrically with respect to the torque input shaft (70)
- a cam ring (18) whose inner wall is placed in contact with the eccentric cam (21) such that the cam ring (18) is urged to rotate by the eccentric cam (21), the cam ring having a flat surface (see Fig. 2) formed on an outer periphery
- a plunger (30) placed to be movable linearly in a direction perpendicular (see Fig. 2) to the axis of rotation of the eccentric cam (21), the plunger (30) having a flat surface which is pressed against said cam ring in slidable abutment with the flat surface of the cam ring (18) so as to prevent the cam

ring from rotating and thereby cause the cam ring (18) to move the plunger (30) linearly

Mori does not teach a safeguard provided in the ring which is responsive to application of a physical load to undergo breakage. Iwasaki et al teach the use of a mechanical safety breaker which fractures along notches when excessive force or torque is applied (col. 8, lines 8-26). Iwasaki et al also teach that the use of a "mechanical safety breaker adapted to operate normally to transmit a force or torque therethrough but to get broken when the magnitude of the force or torque increases beyond a predetermined limit value so as thereby to cease the transmission of the force of torque for the safety purpose is known and used in various mechanical devices" (col. 1, ln. 14-19). Furthermore, Beauchanveau et al teach the use of "a reduced diameter region 28 such that should the fuel pump 10 seize, the reduced diameter region 28 will shear thus restricting damage resulting from the seizure of the fuel pump 10" (col. 1, ln. 58-61). Therefore, it would have been obvious to one of ordinary skill in the art to modify the cam ring (18) of Mori to provide a safeguard in the ring that causes breakage when the ring is subjected to load greater than a given degree for the purpose of minimizing damage to the structure or apparatus housing the rotation-to-linear motion transforming apparatus.

16. Regarding claim 2, according to the combined references, it would have been obvious to provide the safeguard (in the form of a notch) in a portion of the cam ring which is out of abutment with the plunger so as to avoid unnecessary abrasive wear on the plunger from the edges of the notch. Further, it would have been obvious to provide

the safeguard in a location where a tensile stress is added when resistance to sliding motion between the cam ring and the plunger increases, since this would have ensured failure in the case of the most likely mode of seizure in the rotation-to-linear motion transforming apparatus of Mori.

17. Regarding claim 3, Iwasaki et al teach the use of a groove as a safeguard. It would have been obvious to one of ordinary skill in the art to provide the groove in an outer or inner surface of the cam ring so as to promote proper crack propagation in the case of excessive force.

18. Claims 4-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mori in view of Iwasaki et al (US 5,873,784) and Beauchanveau et al (US 5,850,817) as applied to claims 1-3 above, further in view of applicant's admission of prior art.

Regarding claim 4, the previously combined references teach a fuel injection pump (Mori, title) for an engine (Mori, paragraph 3) having a housing (Mori, 11) having formed therein a cam chamber (Mori, see Fig. 1). The previously combined references also teach that the eccentric cam (Mori, 21) is in mechanical connection with a torque input shaft (Mori, 20) into which torque outputted by an engine is inputted, the eccentric cam (Mori, 21) being rotated eccentrically with respect to the torque input shaft.

Further, the previously combined references teach a plunger (Mori, 30) placed to be movable in a direction perpendicular to an axis of rotation of the eccentric cam (Mori, 21), with the plunger having a flat surface pressed against the cam ring (Mori, 18) in slidable abutment with the flat surface of the cam ring (Mori, 18) so as to hold the cam ring (Mori, 18) from rotating, thereby urging the plunger to reciprocate to increase and

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decrease a volume of a fuel pressurizing chamber (Mori, 50) cyclically). The previously combined references also teach the remainder of the details of the eccentric cam, cam ring, and safeguard as discussed in the above rejection of claims 1-3 over the previously combined references. However, the previously combined references do not teach that fuel is supplied to the cam chambers. On page 2, lines 9-13 of the specification of the instant application, the applicant states, "a cam chamber is defined between the cam ring J4 and the housing and filled with fuel which serves to lubricate a contact surface between the cam ring J4 and the plunger J6." This constitutes an admission by the applicant of prior art. It would have been obvious to one of ordinary skill in the art at the time of the invention to further modify the injection fuel pump of Mori to provide fuel to the cam chamber in order to lubricate the slidably abutting surfaces of the plunger and the cam ring.

19. Regarding claim 5, according to the combined references, it would have been obvious to provide the safeguard (in the form of a notch) in a portion of the cam ring which is out of abutment with the plunger so as to avoid unnecessary abrasive wear on the plunger from the edges of the notch. Further, it would have been obvious to provide the safeguard in a location where a tensile stress is added when resistance to sliding motion between the cam ring and the plunger increases, since this would have been the most likely mode of seizure in the injection fuel pump of Nagai et al.

Regarding claim 6, Iwasaki et al teach the use of a groove as a safeguard. It would have been obvious to one of ordinary skill in the art to provide the groove in an outer or

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inner surface of the cam ring so as to promote proper crack propagation in the case of excessive force.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Philip E. Stimpert whose telephone number is (571) 270-1890. The examiner can normally be reached on Mon-Fri 8:00AM-5:00PM, Alt. Fridays, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gary Jackson can be reached on (571) 272-4697. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

PES

PES (25 May 2007)

GARY JACKSON
SUPERVISORY PATENT EXAMINER

Gary Jackson 5/29/2007